Catalogue of American Amphibians and Reptiles.

Sweet, Samuel S., and William S. Parker. 1990. *Pituophis melanoleucus.*

Pituophis melanoleucus (Daudin)
Pine, Bull, and Gopher Snakes

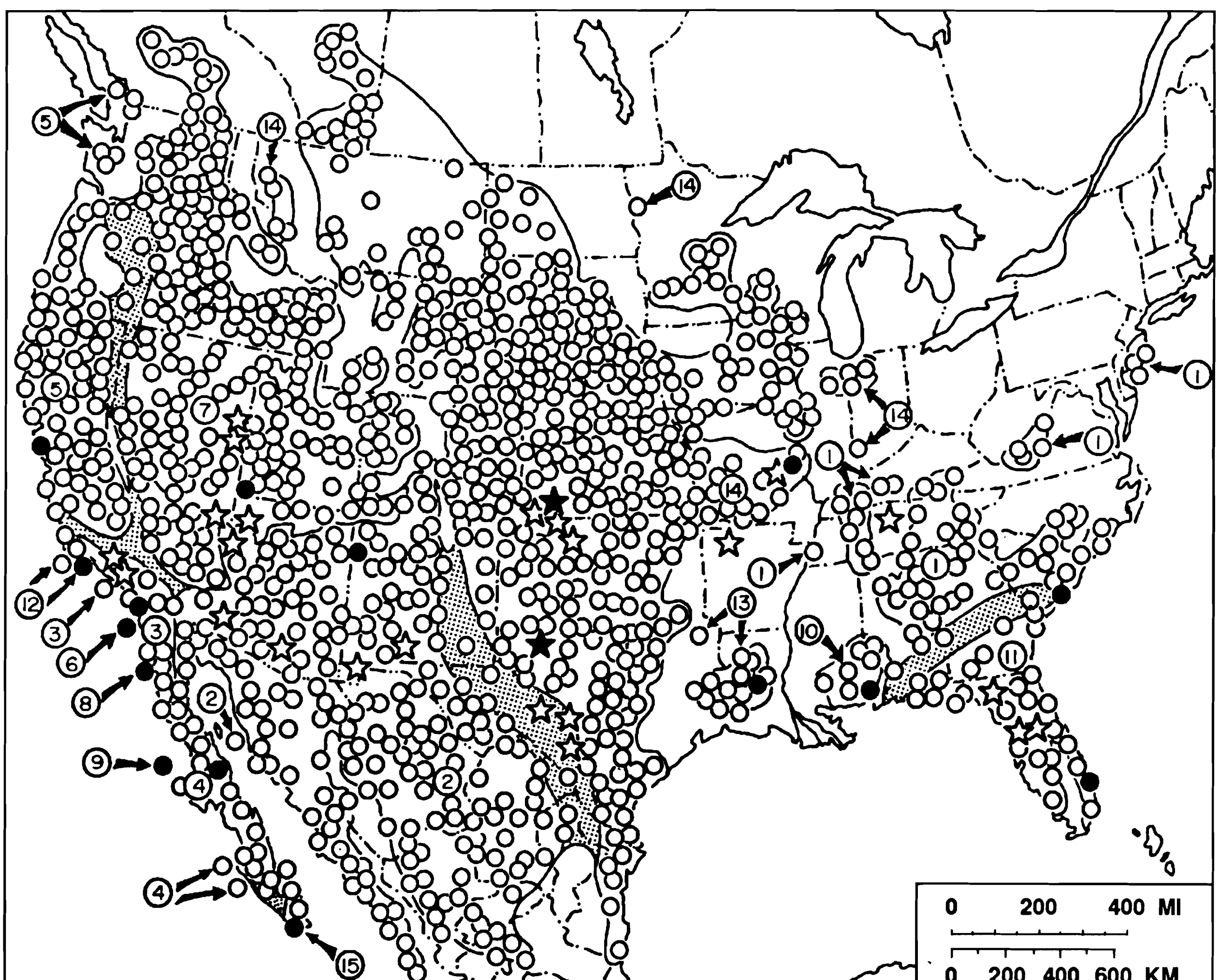
Coluber melanoleucus Daudin, 1803:409. Type-locality, "Floride", restricted to Carolina by Barbour (1921), and to Charleston, South Carolina by Schmidt (1953). Holotype, none designated.
Pituophis melanoleucus: Holbrook, 1842:7.
Rhinechis melanoleucus: Duméril, 1853:453.
Pityophis melanoleucus: Baird, 1859a:pl. 29, fig. 44.
Pituophis melanoleuca: Günther, 1894:125 (part).
Pituophis melanoleucos: Cuesta-Terrón, 1921:170.

• **Content**. 15 recognized subspecies: *affinis, annectens, bimaris, catenifer, coronalis, deserticola, fuliginatus, insulanus, lodingi, melanoleucus, mugitus, pumilus, ruthveni, sayi, vertebralis.*

• **Definition**. *Pituophis melanoleucus* is a large (100-254 cm), short-tailed (10-18% TL), slender to stout constricting colubrid with 4 (2-6) prefrontals, fragmented parietals, 27-37 scale rows at midbody, the lower 4-5 rows smooth, the middorsal rows keeled, a single anal, and a prominent preglottal keel. Tubercles are numerous on head scales, pits are restricted to the orbital margin; paired apical pits are present. Males have 205-252 ventrals, 51-89 subcaudals; females 212-259, 46-79. There are 15-18 maxillary, 8-11 palatine, 7-14 pterygoid and 15-22 mandibular teeth, each series decreasing in size posteriorly. Scale rows, ventral and subcaudal counts, and numbers of teeth are lower in eastern races. The skull is robust in eastern races, less so in the west. Trunk vertebrae are short, with stout, rectangular neural spines and pointed accessory processes directed forward; prominent, knobbed hypapophyses are present on the first 50-60 vertebrae. The hemipenis is subcylindrical and bilobed. An oblique, simple sulcus courses to the apex of the larger right lobe. The basal half has scattered spinules, the distal portion with dense, subequal small spines grading into papillate calyces near the naked crotch; the inverted organ is 9-11 subcaudals in length. Dorsal pattern consists of 22-106 black, brown or red saddles; 2-3 rows of lateral spots, often confluent, coalesce into 6-33 darker crossbars on the tail; ground color is white, tan, yellow, orange, red or black. The venter is white, tan, yellow or black, plain or with irregular dark markings that may form 1-2 subcaudal stripes. Striped and pattern-less individuals occur in some western populations. The eastern subspecies are stout, with high, wedge-shaped snouts; western races are slender, with narrow heads and bluntly-rounded snouts. The species is probably composite (see Comment).

• **Descriptions**. Descriptions are in Cope (1900), Van Denburgh (1922), Stull (1940), Klauber (1946a, 1947), Wright and Wright (1957), Conant (1956, 1975), and Stebbins (1954, 1985).

• **Illustrations**. Several subspecies are shown by line drawings (Cope, 1900), pattern drawings (Stull, 1940), black-and-white photographs (Van Denburgh, 1922; Klauber, 1946a; Conant, 1956, 1975; Wright and Wright, 1957; Mount, 1975), and color photographs (Schmidt and Inger, 1957; Tennant, 1984). Cliburn (1975) illustrated the (partially everted) hemipenis, Miller (1968) the cochlear duct,



Map. Type-localities are indicated by solid circles; open circles represent other localities documented by museum specimens examined by the authors. Open and closed stars represent Pleistocene and Pliocene fossils, respectively. Documented zones of intergradation are stippled; other contact zones are parapatric, with no introgression and only rare hybridization.

Tanner and Avery (1982) the hyoid, Knight (1986) rostral bones, Baker et al. (1972) the karyotype, Licht and Bennett (1972) a scaleless individual, Riemer (1958) and Bechtel and Whitecar (1983) striped patterns, and Bullock and Tanner (1966) skull and vertebrae.

• **Distribution**. The species occupies most of the continental U.S., southwestern Canada, and northern México including Baja California. Several northeastern populations are disjunct, and a gap in the lower Mississippi drainage is filled in part by the isolated subspecies *ruthveni*. There are numerous insular populations on the Pacific coast (Klauber, 1946a,b, 1947; Murphy and Ottley, 1984). Records for Arkansas (Hurter and Strecker, 1909), Maryland (Harris, 1975), New York (Wallace, 1904) and Veracruz (Pérez-Higareda, 1981) probably represent introductions and are not mapped; a record for coastal Michoacán (Alvarez and Díaz-Pardo, 1983) was based on a misidentified *Symphimus leucostomus*.

Eastern races occupy sandy pine woods and dry, shaley ridges; midwestern subspecies occupy prairies; western and Mexican races occur from coastal grasslands and forests through desert habitats into montane forests up to 2800 m. The distribution largely parallels that of pocket gophers and other small fossorial mammals on which these snakes feed. Range maps are in Klauber (1947), Wright and Wright (1957), Conant (1975), Morafka (1977) and Stebbins (1985).

• **Fossil Record**. Pliocene fossils are known from Kansas and Texas (Holman, 1979), Pleistocene fossils from Arkansas, Arizona, California, Florida, Kansas, Missouri, Nevada, New Mexico, Oklahoma, Tennessee, and Texas (Holman, 1981, 1986a,b; Parmley, 1986).

• **Pertinent Literature**. Extensive taxonomic works are by Stull (1940) and Klauber (1946a, 1947). Other topics include phylogenetic relationships (Lawson and Dessauer, 1980; Dowling et al., 1983); snout morphology (Knight, 1986), labial glands (Taub, 1967), costal cartilages (Hardaway and Williams, 1976), lung morphology (Stinner, 1982b), albinism (Bechtel et al., 1980; Dyrkacz, 1981), tail dimorphism (Quinn, 1979), role of dorsal coloration (Jackson et al., 1976), mimicry of rattlesnakes (Kardong, 1980; Sweet, 1985), ecdysis (Cliburn, 1976a), longevity (Bowler, 1977), populations and life history (Fitch, 1949; Parker and Brown, 1980; Brown and Parker, 1982), sex ratio (Gutzke et al., 1985), clutch size (Fitch, 1985), growth (Platt, 1984), food (Reynolds and Scott, 1982), digestion (Skoczylas, 1978), feeding (Brock, 1965; Chiszar et al., 1980; Pough and Groves, 1983; Ruben and Geddes, 1983; De Queiroz, 1984; Heinrich and Klaassen, 1985); prey behavior (Hennessy and Owings, 1978; Halpin, 1983), sound production (Martin and Huey, 1971; Saiff, 1975), hearing (Wever, 1978), excavating (Carpenter, 1982), nesting (Zappalorti et al., 1983; Burger and Zappalorti, 1986), hibernacula (Burger et al., 1988) combat (Bogert and Roth, 1966; Carpenter, 1986), reproduction (Fitch, 1970; Goldberg and Parker, 1975; Cliburn, 1976b), embryonic development (Treadwell, 1962; Gutzke and Packard, 1987), ecological distribution (Reynolds, 1979; Sullivan, 1981a; Zappalorti and Burger, 1986; Burger and Zappalorti, 1988), activity (Reynolds, 1982; Burger and Gochfeld, 1985), mortality (Speake and Mount, 1973), pollution (Bauerle et al., 1975; Geiger and Winsor, 1977), temperature relations (Greenwald, 1971; Landreth, 1972; Sullivan, 1981b), effects of fire (Erwin and Stasiak, 1979), parasites (Wacha and Christiansen, 1974; Bledsoe, 1979), scent-gland lipids (Oldak, 1976), serology (Punzo, 1976; Minton, 1978), blood oxygen (Pough, 1977), metabolism (Bennett and Dawson, 1976), water balance (Dantzler and Holmes, 1974; Cohen, 1975), body fluids (Thorson, 1968), respiration (Jacob, 1980; Stinner, 1982a, 1987), antibiotics (Mader et al., 1985), olfactory bulb activity (Graystone et al., 1970), and serotonin (Quay and Wilhoft, 1964).

• **Etymology.** Etymology is as follows: *melanoleucus*, from *melas* (Greek), "black", and *leukos* (Gr.), "white", in reference to the black and white pattern; *affinis*, from *affinis* (Latin), "related by marriage", perhaps in reference to affinity to *P. m. sayi*; *annectens*, from *annectans* (L.), "to connect", perhaps in reference to the confluent neck blotches; *bimaris*, from *bi-* (L.), "two", and *mare* (L.), "sea", in reference to occurrence on the Baja California peninsula, bounded by two seas; *catenifer*, from *catena* (L.), "a chain", and *ferre* (L.), "to carry", perhaps in reference to the reticulate dorsal pattern; *coronalis*, from *coronalis* (L.), "of a crown", in reference to occurrence on the Islas Coronados; *deserticola*, from *deserere* (L.), "to desert or abandon", and *cola* (L.), "inhabitant", in reference to occurrence in desertic regions; *fuliginatus*, from *fulginosus* (L.), "sooty", in reference to the darkness of the dorsal markings; *insulanus*, from *insularis* (L.), "insular", in reference to occurrence on Isla Cedros; *lodingi*, patronym for Henry P. Löding; *mugitus*, from *mugitus* (L.), "bellowing", in reference to the loud defensive hiss; *pumilus*, from *pumilio* (L.), "a dwarf", in reference to the small size of adults; *ruthveni*, patronym for Alexander G. Ruthven; *sayi*, patronym for Thomas P. Say; *vertebralis*, from *vertebralis* (L.), "vertebral", in reference to the dorsal markings resembling fish vertebrae.

1. *Pituophis melanoleucus melanoleucus* (Daudin)

Coluber melanoleucus Daudin, 1803:409. See species account.
Pituophis melanoleucus melanoleucus Barbour, 1921:117. First use of present combination.

• **Definition**. A subspecies with 25-31 black or brown body saddles (confluent anteriorly in females); 6-7 tail blotches; ground color white or tan; no dark postorbital bar; nape mottled with black; 29 (27-31) midbody scale rows; head small; rostral high, keeled.

• **Remarks**. Intergrades with *P. m. mugitus* in central Alabama (Mount, 1975), Georgia and southern South Carolina (Neill, 1941).

2. *Pituophis melanoleucus affinis* Hallowell

Pituophis affinis Hallowell, 1852:181. Type-locality, "New Mexico", restricted to "Zuñi river, New Mexico" by Hallowell (1853), and to Zuni, McKinley County, New Mexico by Smith and Taylor (1950). Holotype, Acad. Natur. Sci. Philadelphia 3792 (long thought lost), subadult male, collected by Samuel W. Woodhouse between 1 and 24 September 1851 (examined by S.S.S.)
Pityophis affinis: Hallowell, 1853:130.
Pituophis bellona: Baird and Girard, 1853:66 (part).
Rhinechis mexicanus: Duméril, 1853:453.
Pituophis mexicanus Duméril, Bibron and Duméril, 1854:236. Type-locality "Mexique," given as Sabinas Hidalgo, Nuevo León, by Smith and Taylor (1950). Holotype in Mus. Nat. Hist. Natur., Paris, cotype listed as National Museum of Natural History (USNM) 1415 by Cochran (1961) (not seen by authors).
Pityophis sayi bellona: Cope, 1875:39 (part).
Pityophis sayi var. *mexicanus:* Cope, 1875:39.
Pituophis sayi mexicanus: Yarrow, 1875:1539.
Pityophis bellona: Coues, 1875:617.
Pityophis catenifer var. *mexicanus:* Garman, 1884a:52.
Pityophis catenifer: Garman, 1884b:27 (part).
Pityophis catenifer mexicanus: Cope, 1887:72.
Pityophis mexicanus: Boettger, 1893:xxviii.
Pityophis catenifer bellona: Brown, 1901:54 (part).
Pituophis catenifer sayi: Ruthven, 1907:581.
Pituophis catenifer deserticola: Stejneger, 1902:153 (part).
Pituophis catenifer rutilus Van Denburgh, 1920:24. Type-locality, "Tucson, Pima Co[unty], Arizona". Holotype, Calif. Acad. Sci. 33869, adult female, collected by Joseph R. Slevin, 11 April 1912 (not seen by authors).
Pituophis sayi affinis: Stull, 1932:4.
Pituophis catenifer affinis: Smith and Mittleman, 1943:248.
Pituophis catenifer rutilis: Smith and Taylor, 1950:354.
Pituophis melanoleucus affinis: Smith and Kennedy, 1951:96. First use of present combination.

• **Definition**. A subspecies with 34-63 unconnected, biconcave saddles, brown or rusty anteriorly (black in montane forms) and darker posteriorly; bases of light anterior interblotch scales often dark; 9-21 tail blotches; ground color tan or yellow; a dark postorbital bar; nape tan or yellow with small black spots; 31 or 33 (29-35) midbody scale rows; rostral narrow, sharply rounded anteriorly.

• **Remarks.** May intergrade with *P. m. deserticola* in northeastern Arizona (Klauber, 1947) and northwestern New Mexico (Gehlbach, 1965), but not in California. It is narrowly sympatric with *P. m. annectens* without intergrading in southern California (Klauber, 1947), and interdigitates by habitat separation with *P. deppei* from Coahuila through San Luis Potosí, Zacatecas and Durango to southern Chihuahua (Conant, 1965; but see Morafka, 1977).

3. *Pituophis melanoleucus annectens* Baird and Girard

Pituophis annectens Baird and Girard, 1853:72. Type-locality, "San

Diego, Cal[ifornia]". Holotype, USNM1839, subadult male, collected by John L. LeConte, between May and September, 1850 (not seen by authors).
Elaphis reticulatus: Duméril, 1853:453.
Elaphis reticulatus Duméril, Bibron and Duméril, 1854:246. Type-locality unknown. Holotype in Mus. Nat. Hist. Natur., Paris (received from Mus. Marseille in 1846), further data unknown (not seen by authors).
Pityophis annectens: Hallowell, 1859:15.
Pityophis vertebralis: Hallowell, 1859:24 (part).
P. [ituophis] aunectens: Cooper, 1860:300.
Pituophis reticulatus: Jan, 1863:59.
Pityophis catenifer: Cope, 1875:39 (part).
Pityophis sayi bellona: Streets, 1877:40.
Pituophis catenifer: Van Denburgh, 1897:195 (part).
Pityophis catenifer catenifer: Brown, 1901:53 (part).
Pituophis catenifer annectens: Van Denburgh and Slevin, 1919:26 (part).
Pituophis catenifer annectans: Klauber, 1931:9.
Pituophis catenifer anectens: Osorio Tafall, 1948:353.
Pituophis melanoleucus annectens: Smith and Kennedy, 1951:96. First use of present combination.

• **Definition**. A subspecies with 65-106 rounded, black or brown body blotches alternating with enlarged dorsolateral blotches on the neck; 16-33 tail spots; ground color tan or yellow with gray suffusion laterally; postorbital bar pale or absent; nape often dull orange; 33 (29-37) midbody scale rows; rostral bluntly rounded.

• **Remarks.** Intergrades in southern California with *P. m. catenifer* and *P. m. deserticola*, but not *P. m. affinis* (Klauber, 1947).

4. *Pituophis melanoleucus bimaris* Klauber

Coluber catenifer, var. *vertebralis:* Mocquard, 1899:320.
Pityophis vertebralis: Cope, 1900:879 (part).
Pituophis vertebralis: Stejneger and Barbour, 1917:86 (part).
Pituophis catenifer annectens: Stull, 1932:5 (part).
Pituophis catenifer bimaris Klauber, 1946a:7. Type-locality, "Santa Gertrudis, near El Arco (Lat. 28° N), Baja California [del Norte], Mexico". Holotype, San Diego Soc. Natur. Hist. 32621, adult male, collected by Robert S. Hoard, August 1939 (not seen by authors).
Pituophis melanoleucus bimaris: Smith and Kennedy, 1951:96. First use of present combination.

• **Definition**. A slender subspecies with 34-46 biconcave body blotches, black anteriorly and posteriorly, brown at midbody, and confluent laterally on neck; 8-14 tail spots; a dark subcaudal stripe; ground color yellow or orange; no dark prefrontal or postorbital bars; nape unmarked; 33 (31-35) midbody scale rows; eye large; snout narrow, truncate; rostral wider than high.

• **Remarks**. Intergrades with *P. m. vertebralis* in the Isthmus of La Paz, but is parapatric with *P. m. annectens* without intergradation in northwestern Baja California (Klauber, 1946a).

5. *Pituophis melanoleucus catenifer* (Blainville)

Coluber catenifer Blainville, 1835:290. Type-locality, "Californie", restricted to vicinity of San Francisco by Schmidt (1953). Holotype in Mus. Nat. Hist. Natur., Paris, collected by Paolo Emilio Botta in 1827-1829 (not seen by authors).
Pituophis catenifer: Baird and Girard, 1853:69.
Pituophis Wilkesii Baird and Girard, 1853:71. Type-locality, "Puget Sound, Or[egon=Washington]". Two cotypes, USNM 5471, collected by U.S. Exploring Expedition, 1841 (not seen by authors).
Pityophis Heermanni Hallowell, 1853:236. Type-locality, "...mines, in the vicinity of the Cosumnes river [Amador County], California". Holotype in Acad. Natur. Sci. Philadelphia, subadult, collected by A. L. Heermann, date unknown (not seen by authors).
Pityophis catenifer: Baird, 1859c:11.
Pityophis vertebralis: Hallowell, 1859:24.
Pituophis melanoleucus var. *catenifer:* Jan, 1863:59.
Petuophis wilkesii: Lord, 1866:307.
Pituophis Wilksei: Wright, 1878:97.
Pityophis sayi bellona: Yarrow and Henshaw, 1878:1634 (part).
Pityophis mexicanus bellona: Cope, 1883:21.
Pityophis sayi sayi: Yarrow, 1883:16 (part).
Pityophis catenifer catenifer: Brown, 1901:53.
Pituophis catenifer catenifer: Dice, 1916:303.
Pituophis catenifer heermanni: Van Denburgh, 1920:16.
Pituophis catenifer annectens: Stull, 1932:5 (part).
Pituophis melanoleucus catenifer: Smith and Kennedy, 1951:96. First use of present combination.

• **Definition**. A subspecies with 47-90 square, brown or black body blotches (lower counts occur inland), dorsolateral dark blotches reduced to streaks anteriorly; 14-31 black tail spots; ground color tan or yellow; heavy, dark prefrontal and postorbital bars; nape dark brown; 33 (29-35) midbody scale rows; rostral bluntly rounded.

• **Remarks**. Intergrades with *P. m. deserticola* in northern California and central Oregon (Klauber, 1947; Ferguson et al., 1956).

6. *Pituophis melanoleucus coronalis* Klauber

Pituophis catenifer: Van Denburgh and Slevin, 1914:141.
Pituophis catenifer annectens: Van Denburgh and Slevin, 1919:216 (part).
Pituophis catenifer coronalis Klauber, 1946a:19. Type-locality, "South Coronado Island [Baja California del Norte], Mexico". Holotype, San Diego Soc. Natur. Hist. 20229, adult female, collected by Philip M. Klauber, 11 June 1933 (not seen by authors).
Pituophis melanoleucus coronalis: Smith and Kennedy, 1951:96. First use of present combination.

• **Definition.** A subspecies with 64-70 rounded body blotches, black anteriorly and posteriorly, dark brown at midbody; 18-26 black tail spots; ground color olive, head dark brown; 33-35 midbody scale rows; suboculars exclude labials from orbit; head plates irregularly fragmented and fused.

• **Remarks**. Derived from *P. m. annectens* (Klauber, 1946a).

7. *Pituophis melanoleucus deserticola* Stejneger

Pituophis bellona: Cooper, 1870:66.
Pityophis bellona: Cope, 1872, 468.
Pityophis sayi var. *bellona:* Cope, 1875:39 (part).
Pityophis sayi sayi: Yarrow, 1883:16 (part).
Pityophis catenifer: Cope, 1883:18.
Pityophis catenifer bellona: Garman, 1884b:27.
Pituophis catenifer: Stejneger, 1891:110.
Pituophis catenifer deserticola Stejneger, 1893:206. Type-locality, "...east slope of the Beaverdam Mts. [Washington Co.], Utah". Lectotype (see Klauber, 1947), USNM 18070, an adult male, collected by C. Hart Merriam, 11 May 1891 (not seen by authors).
Pituophis catenifer sayi: Ruthven, 1915:950.
Pituophis catenifer stejnegeri Van Denburgh, 1920:21. Type-locality, "Fort Douglas, Salt Lake County, Utah". Holotype, California Acad. Sci. 14203, an adult male, collected by Joseph C. Clemens, between June and 4 July 1908 (not seen by authors).
Pituophis melanoleucus deserticola: Smith and Kennedy, 1951:96. First use of present combination.

• **Definition.** A subspecies with 43-71 quadrangular body blotches, black and confluent laterally on neck, brown posteriorly; dark keels on anterior interblotch scales; 12-22 black tail spots; ground color cream to yellow; dark postorbital bar in northern populations only; nape pale in south, heavily mottled in north; 31 (27-35) midbody scale rows; snout truncate, rostral slightly rounded.

• **Remarks**. See Klauber (1947) for a discussion of geographic variation within this subspecies.

8. *Pituophis melanoleucus fuliginatus* Klauber

Pityophis sayi bellona: Streets, 1877:40.
Pituophis catenifer deserticola: Van Denburgh, 1895:149.
Pituophis catenifer: Van Denburgh, 1905:21 (part).
Pituophis catenifer annectens: Van Denburgh and Slevin, 1919:216 (part).
Pituophis catenifer fuliginatus Klauber, 1946a:14. Type-locality, "San Martín Island, off the west coast of Baja California [del Norte], Mexico". Holotype, San Diego Soc. Natur. Hist. 17449, adult female, collected by Lewis W. Walker,11 July 1939 (not seen by authors).

Pituophis catenifer fuliginosus: Smith and Taylor, 1950:314.
Pituophis melanoleucus fuliginatus: Smith and Kennedy, 1951:96. First use of present combination.

• **Definition**. A subspecies with 55-70 irregular and confluent black or brown body blotches; 14-22 black tail spots; subcaudals dark laterally, defining a midventral pale stripe; ground color cream or buff; head dark, heavily mottled with black; 33 (31-35) midbody scale rows; prefrontals irregular; rostral bluntly rounded.

• **Remarks**. Derived from *P. m. annectens* (Klauber, 1946a).

9. *Pituophis melanoleucus insulanus* Klauber

Pituophis catenifer annectens: Slevin, 1926:206 (part).
Pituophis vertebralis: Stull, 1932:3 (part).
Pituophis catenifer insulanus Klauber, 1946a:11. Type-locality, "Cedros (Cerros) Island off the west coast of Baja California [del Norte], Mexico". Holotype, California Acad. Sci. 56353, adult female, collected by Joseph R. Slevin, 7 August 1922 (not seen by authors).
Pituophis melanoleucus insulanus: Smith and Kennedy, 1951:96. First use of present combination.
Pituophis catenifer insularis: Slevin and Leviton, 1956:548.

• **Definition.** A slender form with 52-64 biconcave black blotches, confluent laterally on neck, brown at midbody; 11-17 black tail spots; ground color orange; head red with black spots; no postorbital bar; 31-33 midbody scale rows; eye large; snout narrow, truncate.

• **Remarks.** Derived from *P. m. bimaris* (Klauber, 1946a).

10. *Pituophis melanoleucus lodingi* Blanchard

Pituophis melanoleucus: Blanchard, 1920:30.
Pituophis lodingi Blanchard, 1924:531. Type-locality, [between Irvington and Grand Bay,] "Mobile County, Alabama". Holotype, Univ. Michigan 58800, adult male, collected by Henry P. Löding, 30 April 1924 (not seen by authors).
Pituophis melanoleucus lodingi: Stull, 1932:3. First use of present combination.

• **Definition.** A black or dark brown subspecies; juveniles may show a blotched pattern which darkens with age (Reichling, 1982); 29 or 31 (27-32) midbody scale rows; head small; rostral high, keeled.

• **Remarks**. Intergrades with *P. m. mugitus* in southern Alabama and western Florida (Mount, 1975), may have intergraded with *P. m. ruthveni* in southern Louisiana (Crain and Cliburn, 1971).

11. *Pituophis melanoleucus mugitus* Barbour

Pituophis melanoleucus: Wied-Neuwied, 1865:95 (part).
Pityophis melanoleucus: Cope, 1877:64 (part).
Pituophis melanoleucus mugitus Barbour, 1921:117. Type-locality, "ten miles north of West Palm Beach [Palm Beach County], Florida". Holotype, Mus. Comp. Zool. 15525, adult female, collected by Thomas and R. Barbour in 1919 (not seen by authors).
Pituophis mugitus: Stejneger and Barbour, 1923:96.

• **Definition**. A pale subspecies with 26-29 gray, brown or rusty saddles, obscure or confluent anteriorly; 8-9 rusty tail spots; ground color cream or tan, rarely pale yellow; no postorbital bar; nape pale; 33 (29-35) midbody scale rows; head small; rostral high, keeled.

12. *Pituophis melanoleucus pumilus* Klauber

Pituophis catenifer: Van Denburgh and Slevin, 1914:136.
Pituophis catenifer catenifer: Van Denburgh and Slevin, 1919:211.
Pituophis catenifer pumilus Klauber, 1946b:41. Type-locality, "Santa Cruz Island, Santa Barbara County, California". Holotype, San Diego Soc. Natur. Hist. 17238, subadult male, collected by Norman Bilderback, 5 May 1938 (not seen by authors).
Pituophis catenifer pumilis: Stebbins, 1954:500.
Pituophis melanoleucus pumilus: Sloan, 1965:6. First use of present combination.
Pituophis melanoleucus pumilis: Stebbins, 1966:157.

• **Definition.** A small subspecies (to 110 cm TL) with 64-82 dark blotches, confluent with dorsolateral series anteriorly; 17-28 black tail spots; ground color olive; a dark postorbital bar; nape dark; 27-29 midbody scale rows; snout short, depressed; rostral rounded.

• **Remarks.** Occurs on Santa Cruz and Santa Rosa islands; derived from *P. m. annectens* or *P. m catenifer* (Klauber, 1946b).

13. *Pituophis melanoleucus ruthveni* Stull

Pituophis melanoleucus ruthveni Stull, 1929:1. Type-locality, "Longleaf [Rapides Parish], Louisiana". Holotype, USNM 76278, adult male, collected by W. D. Harris, 24 March 1927 (not seen by authors).
Pituophis ruthveni: Conant, 1956:28.

• **Definition**. A subspecies with 28-42 dark body saddles, paler at midbody, confluent anteriorly in females; 6-13 tail spots; ground color white or tan, rarely yellow; rarely a postorbital bar; nape mottled; 31 (27-33) midbody scale rows; head small; rostral high, keeled.

• **Remarks**. No evidence of intergradation or range contact with other subspecies (Conant, 1956; Thomas et al., 1976).

14. *Pituophis melanoleucus sayi* (Schlegel)

Coluber melanoleucus var. *Say*: Harlan, 1827:360.
Coluber sayi Schlegel, 1837:157. Type-locality, "Missouri", restricted to Carthage, Jasper County, Missouri by Smith and Taylor (1950), and to St. Louis, Missouri by Schmidt (1953). Holotype not known to exist, collected by Thomas P. Say, date unknown.
Churchillia bellona Baird and Girard, 1852a:70. Type-locality, "along the Rio Grande", restricted to "the left bank of the Rio Grande, at the crossing near Presidio del Norte" by Baird and Girard (1852b), and to Presidio del Norte, Chihuahua, México by Stull (1940). Holotype, USNM 1519 (now lost), adult, collected by General S. Churchill in 1846.
Pituophis bellona: Baird and Girard, 1853:66 (part).
Pituophis McClellani Baird and Girard, 1853:68. Type-locality, "Red River, Ark[ansas]", listed as Red River, Deaf Smith County, Texas by Cochran (1961). Holotype, USNM 1540, subadult, collected by Randolph B. Marcy and George B. McClellan, 28 June 1852 (not seen by authors).
Pityophis bellona: Kennicott in Baird, 1859b:19.
Pityophis mcclellani: Baird, 1859a:pl. 29, fig. 47.
Pituophis sayi: Cooper, 1860:300.
Pituophis melanoleucus: Wied-Neuwied, 1865:95 (part).
Pityophis sayi sayi: Cope, 1875:39.
Pityophis catenifer var. *sayi:* Garman, 1884a:52.
Pityophis sayi var. *bellona:* White, 1884:19.
Pityophis sayii: Higley, 1889:163.
Pityophis catenifer sayi: Taylor, 1891:335.
Pityophis catenifer bellona: Taylor, 1891:337.
Coluber melanoleucus: Boulenger, 1894:68 (part).
Pityophis macclellanii: Cope, 1900:870.
Pityophis melanoleuca: Lewis, 1905:124.
Pityophys catenifer sayi: Notestein, 1905:116.
Pituophis catenifer sayi: Gaige, 1914:4.
Pituophis sayi sayi: Force, 1925:25.
Pituophis melanoleucus sayi: Smith and Kennedy, 1951:96. First use of present combination.

• **Definition**. A robust subspecies with 33-66 black, brown or rusty body blotches, paler at midbody; bases of light interblotch scales dark; 9-19 black tail spots; ground color yellow; heavy, dark prefrontal and postorbital bars; nape heavily spotted with black; 29-37 midbody scale rows; head large; rostral high, strongly keeled.

• **Remarks**. Parapatric with *P. m. deserticola* in the Bitterroot Range, Montana-Idaho, with no intergradation. Intergrades with *P. m. affinis* in New Mexico and Texas south and west of the High Plains (Kizirian, 1987). Not confirmed in México west of the Gulf coastal slope.

15. *Pituophis melanoleucus vertebralis* (Blainville)

Coluber vertebralis Blainville, 1835:293. Type-locality, "Californie", restricted to Cape San Lucas, Baja California [del Sur], México, by Smith and Taylor (1950). Holotype in Mus. Nat. Hist. Natur.,

Paris (not seen by authors).
Rhinechis vertebralis: Duméril, 1853:453.
Pituophis vertebralis: Duméril, Bibron and Duméril, 1854:238.
Pityophis haematois Cope, 1860:342. Type-locality, "Cape St. Lucas, Lower California" [Baja California del Sur, México]. Two syntypes, USNM 4682, and Acad. Natur. Sci. Philadelphia 3791, collected by John Xantus, date unknown (not seen by authors).
Pityophis vertebralis: Cope, 1861:300.
Pituophis melanoleucus var. *vertebralis:* Jan, 1863:59.
Pityophis catenifer vertebralis: Garman, 1884b:27.
Coluber catenifer: Boulenger, 1894:67.
Coluber catenifer var. *vertebralis:* Mocquard, 1899:320.
Pituophis catenifer annectens: Stull, 1932:5 (part).
Pituophis catenifer vertebralis: Klauber, 1946a:22.
Pituophis melanoleucus vertebralis: Smith and Kennedy, 1951:96. First use of present combination.

• **Definition**. A slender form with 38-51 biconcave blotches, red and laterally confluent anteriorly, black posteriorly; 8-15 black tail bands; often a dark subcaudal stripe; ground color orange; no head markings; eye large; snout narrow and truncate; rostral wider than high.

• **Comment.** Following Smith and Kennedy (1951) and Conant (1956) these 15 taxa are usually considered conspecific, though the validity of this view has been questioned (e.g. Ballinger et al., 1979; Knight, 1986). Sweet (1984) recognized four groups: *melanoleucus* (4 eastern races); *sayi* and *affinis*; *catenifer* (6 western races); and *vertebralis* (plus *bimaris* and *insulanus*), based on differences in cranial morphology and evidence of distributional contacts with little or no intergradation. Numerous records of captive hybridization between subspecies (e.g. Himmelstein, 1974; Kennard, 1980) predominantly involve males of the *catenifer* group.

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